CA2 ON
WR 610
1969
L35
1972 issue

ONTARIO

MINISTRY OF THE ENVIRONMENT

WATER POLLUTION SURVEY

# of the

TOWN OF LINDSAY

COUNTY OF VICTORIA

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WATER POLLUTION SURVEY

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TOWN OF LINDSAY

COUNTY OF VICTORIA

MINISTRY OF THE ENVIRONMENT

DISTRICT ENGINEERS SECTION

SANITARY ENGINEERING BRANCH

1972

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INTRODUCTION

In 1969 a water pollution survey was made in the Town of Lindsay. Its purpose was to locate any sources of contamination which might impair the water quality. The field investigations were confined to the area inside the municipal boundaries. Several problems were found. A copy of a report on the survey's findings was forwarded to the concerned parties in February 1970. The report contained recommendations directing the municipal officials to eliminate the pollution problems in their storm sewer system as well as directing private concerns to correct their problems.

During the summer of 1971, further investigations were made in the Town of Lindsay, to determine how effective the corrective measures had been to abate the problems mentioned in the 1970 Pollution Survey Report. Special emphasis was placed on investigating problems along the local watercourse known as "Sinister Creek".

All samples collected during the investigations were submitted to the Ontario Water Resources Commission Laboratory in Toronto for examination and analysis. The samples collected were grab samples and a summary of the results has been included in the appendix.

WATER POLLUTION CONTROL FACILITIES

Treatment Works

The Town of Lindsay is served by a system of waste stabilization ponds, which consists of six cells having a total surface area of 109 acres. The waste stabilization ponds were constructed in 1963. The ponds are located in the Township of Ops just north of Lindsay on the east bank of the Scugog River. The treated wastes from the ponds are discharged on a continuous basis to a marshy area beside the Scugog River.

The calculated average day flows to the waste stabilization ponds in 1970 and 1971 were 1.29 MGD and 1.42 MGD respectively. Based on the average day flows and the operator's routine sampling program, the following loadings were calculated:

Waste stabilization pond loading	1970 - 5 day BOD	15.1 lb/acre/day
	Suspended Solids	18.5 lb/acre/day
	1971 - 5 day BOD	15.4 lb/acre/day
	Suspended Solids	20.6 lb/acre/day
Loading on Scugog River	1970 - 5 day BOD	339 lb/day
	Suspended Solids	387 lb/day
	1971 - 5 day BOD	447 lb/day
	Suspended Solids	383 lb/day

It is noted that the 1971 calculated BOD loading of 15.4 lbs/acre/day is somewhat less than the design criteria of 20 lbs/acre/day. The population served is, however, slightly greater than 100 persons/acre and the sewage flow per capita is higher than in other similar installations. The pond is therefore considered to be operating close to design capacity and consequently, an engineering study related to expansion has been authorized by the Town as recommended by O.W.R.C.

The 1971 results indicate that the calculated BOD loading on the waste stabilization ponds has increased from approximately 63 percent of the design loading in 1969 to approximately 77 per cent. The operating efficiency of the lagoons during 1971 was approximately 73 per cent for BOD and 83 per cent for suspended solids. In the operation of most waste stabilization ponds best efficiency occurs in the spring and in the fall. There is a similar pattern for suspended solids but best solids removal usually occurs in the late fall. The operating efficiency of waste stabilization ponds seems to correspond with the growth of algae in the pond. Generally, waste stabilization ponds provide a removal efficiency in the range of 65 - 90 per cent for BOD and a similar removal efficiency for suspended solids. The present pond treatment efficiency is within the aforementioned range. The reduction of coliform bacteria in the ponds is, however, significantly less than normally expected and this could possibly be attributed to somewhat lower detention of the wastes in the pond relative to other similar installations.

During August 1970 and again in March 1971, a study was made of the BOD loading capacity of the Scugog River below Lindsay. The study was intended to measure the effect of the municipal sewage works effluent on the water quality of the Scugog River. The results of the study indicated that most of the organic and nutrient materials discharged from the ponds are assimilated in the marsh area downstream from the waste stabilization ponds. The marsh also effected a reduction in coliform bacteria such that despite high concentrations of coliform bacteria in the pond effluent, there was no appreciable effect on the Scugog River downstream of the pond. This was especially true during the summer season. The study recommended that because dissolved oxygen flucutations were at times approaching the O.W.R.C.'s minimum stream and water quality objective of 5.0 ppm during the March survey, the BOD loading from the lagoon should be limited to a level near 300 - 350 lbs/day. The calculated BOD loading on the Scugog River slightly exceeded the above recommended limits in 1971.

Expansion of Treatment Facilities

In April 1971, the O.W.R.C. informed various municipalities and others, of a program of phosphorus removal for sewage treatment plants in the Province. The program includes sewage works which discharge effluent to recreational inland waters, such as the Trent River System. The deadline for the installation of phosphorus removal facilities in this area of the Province is December 31, 1973. The phosphorus removal program will require that all plants be able to remove at least 80 per cent of the phosphorus loading on the sewage treatment plant. Phosphorus removal facilities will be required as part of the treatment facilities at Lindsay. At the present time the waste stabilization ponds are removing 40 per cent of the phosphorus in the raw sewage.

The present sewage treatment facilities are operating near capacity. Additional treatment capacity will be needed in the near future to satisfy the increasing sanitary and industrial wastes needs of the town. Expansion of the sewage treatment facilities has been recommended to the Town Officials. The Town has authorized a study. Early in 1972, the firm of Oliver, Lloyd & Associates completed the phase of the study which involves an evaluation of the collection system and future expected sewage flows. Work on the second phase of the study is being delayed pending the results of research by the Ministry of the Environment, on methods of phosphorus removal for the various types of sewage treatment, including waste stabilization ponds. It is expected that studies on phosphorus removal will be completed sometime this year, and the phase of the study related to expansion of the sewage treatment facilities will begin. At the present time work is being carried out by the Town and industry to correct problems in the collection system.

The Town of Lindsay is currently undertaking a program to make improvements in their collection system to prevent raw sewage discharges at the sewage pumping stations and to separate the storm and sanitary sewer systems. During the past year, frequent bypassing at the Colborne Street pumping station occurred as a result of excessive sewage flows. In the previous years some bypassing occurred during the spring runoff and during periods of very heavy rainfall because of the combined storm and sanitary sewer systems. During 1971 it became very evident that the loading on the sanitary collection system was excessive, resulting in bypassing taking place at the inlet of the Colborne Street syphon, even during dry weather flows. Through co-operation with Brinton Carpets Ltd., a major contributor to the waste loading on the system, steps have been taken to reduce and to equalize its waste loading on the sanitary sewer system. This should greatly reduce the frequency of bypassing of sewage this year.

An engineering study and a report on the sewage collection system has also been made by a consulting engineer. The report contains recommendations which will correct most of the existing problems. Basically the report recommends upgrading of the Kent Street and Cobourg Street pumping station plus a storm sewer separation program. The Town officials have adopted the recommendations in the report in principle and have authorized final design of the needed alterations to Colborne Street pumping station.

WATER POLLUTION SURVEY

Review - 1970 Results and Action Taken

The water pollution survey report issued in 1970 reviewed the water pollution problems in the Town of Lindsay which were first brought to the attention of the local officials in 1964. The results of the 1970 survey showed improvement in the water quality since 1964, but several problems were still evident. Steps were being taken by both municipal and private officials to correct the pollution problems.

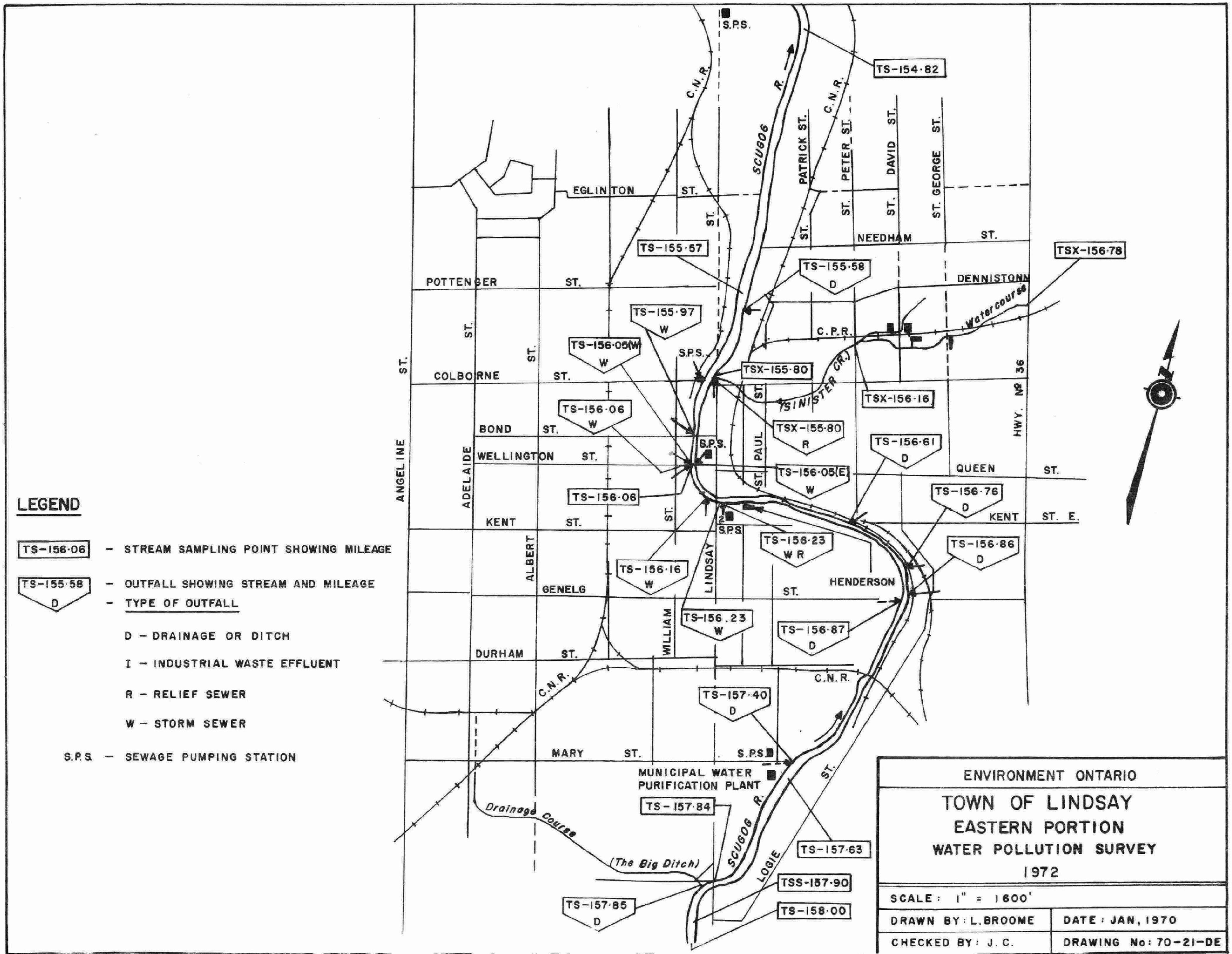
There was evidence of problems in several municipal storm sewers. A review of the bacteriological sample results indicate evidence of sanitary wastes in the following outfalls:

T.S. - 155.97W Municipal storm sewer discharging to the west bank of Scugog River at Bond Street.

T.S. - 156.23WR Municipal storm sewer discharging to south bank of Scugog River east of Lindsay Street.

T.S. - 156.16W Municipal storm sewer discharging to south bank of Scugog River west of Lindsay Street.

A sample collected from an outfall from Union Carbide Limited showed evidence of sanitary wastes. Samples collected from an outfall from Turner and Seymour Company Limited showed evidence of anionic detergents and cyanide wastes.



LEGEND

TS-156·06 – STREAM SAMPLING POINT SHOWING MILEAGE

TS-155·58 D – OUTFALL SHOWING STREAM AND MILEAGE – TYPE OF OUTFALL

D – DRAINAGE OR DITCH

I – INDUSTRIAL WASTE EFFLUENT

R – RELIEF SEWER

W – STORM SEWER

S.P.S. – SEWAGE PUMPING STATION

ENVIRONMENT ONTARIO

TOWN OF LINDSAY
EASTERN PORTION
WATER POLLUTION SURVEY
1972

SCALE : 1" = 1600'	
DRAWN BY : L. BROOME	DATE : JAN, 1970
CHECKED BY : J. C.	DRAWING No : 70-21-DE

The officials of the Town of Lindsay initiated a program of sampling and dye testing the storm sewer system in the area where evidence of sanitary wastes were detected. A number of corrections have been made since the 1970 report was released.

The officials of Union Carbide Limited were very quick to initiate a program of sampling and dye testing to determine the source of the contamination. There was no evidence of incorrect plumbing arrangements inside the plant but a sanitary sewer running parallel to the waste water outfall was found to be leaking and the necessary repairs to prevent further seepage into the creek were made. The company officials have continued to monitor the outfall and the creek just downstream and the problem has not recurred.

The Turner and Seymour Company Limited solved their problem by directing all of their wastes to the municipal sewage collection system.

1971 Survey

Investigations were made in the Town of Lindsay during the past spring and summer, to locate any pollution problems. On July 16, 1971, a set of samples was collected from outfalls and stream sampling points along the Scugog River. The sampling points included stations examined during previous surveys to determine whether any improvement or further deterioration had taken place. Special investigations were concentrated along Sinister Creek because of the extent of problems in this area.

The map on page nine shows the sampling locations along the Scugog River and some of the sampling locations along "Sinister Creek". A more detailed map of "Sinister Creek" on page 13 shows the sampling points monitored during this survey.

Scugog River

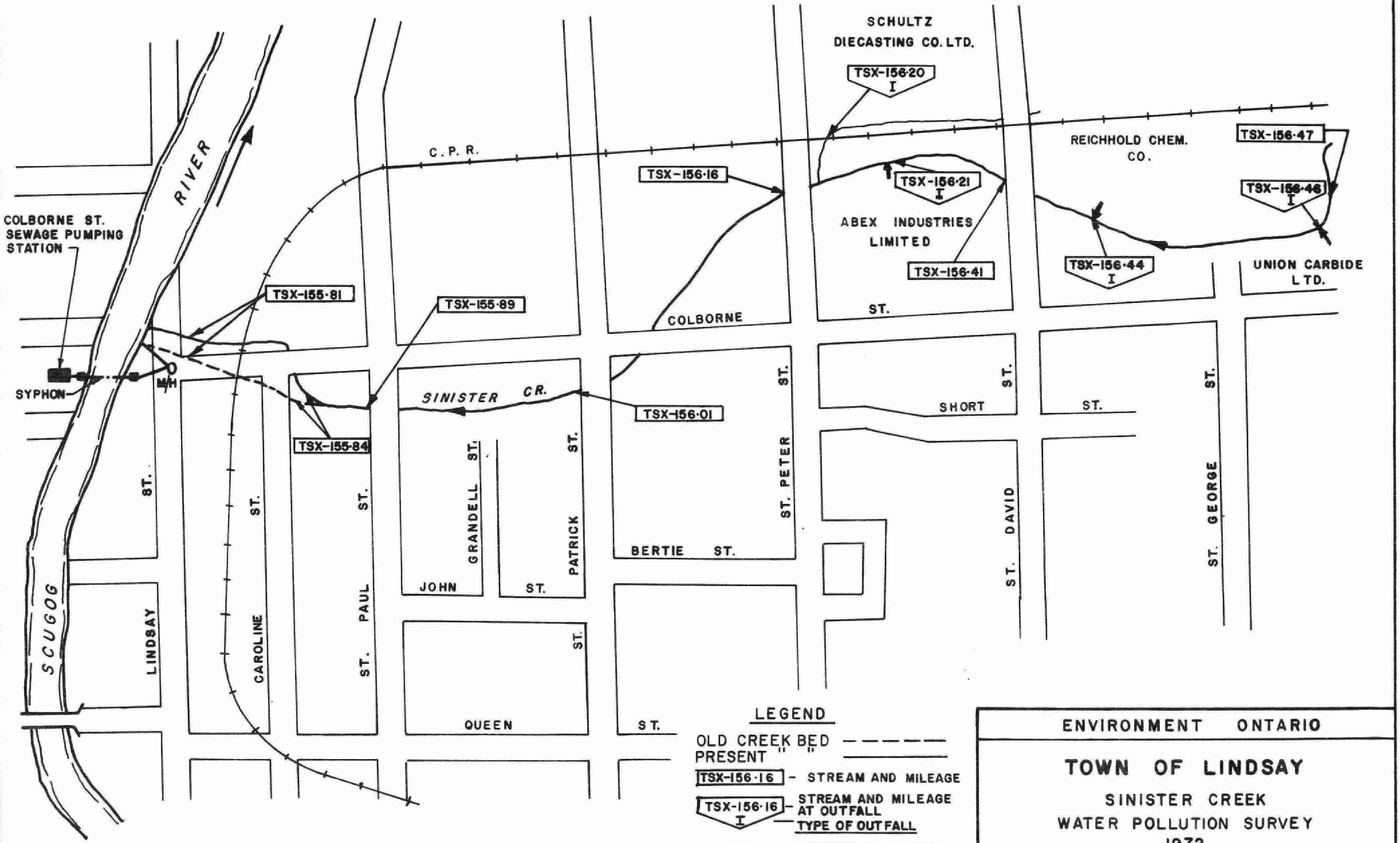
The results of samples collected from the Scugog River reflect the continued existance of problems along the river. Most of the problems have been reported in previous surveys. The water quality of Scugog River showed serious deterioration below the locks at Lindsay Street. Effluents from the storm sewers in this area continue to pollute the river. Evidence of sanitary wastes is still apparent in the effluents from the municipal storm sewers mentioned earlier in the report. During periods of severe runoff there is substantial infiltration of water into the sanitary sewer system. This results in overloading of the sanitary sewer system and consequently diluted raw sewage from the Kent Street pumping station is discharged to the Scugog River at the locks just east of Lindsay Street. Sanitary wastes were also detected in the Scugog River at the mouth of "Sinister Creek". Overflows of sanitary wastes to "Sinister Creek" as a result of hydraulic overloading of the Colborne Street pumping station, were responsible for the adverse results at the mouth of Sinister Creek.

A summary of the sample results has been included in Appendix A, Tables IA and IB.

Sinister Creek

"Sinister Creek" originates in an area east of Union Carbide Limited. During the summer months there is no flow in the creek other than that produced by wastewater discharges from the industries along the watercourse. Union Carbide Limited is the major source of waste water. During the dry weather months, flows from their plant represent the headwaters of the creek. Further downstream, cooling wastewater from Reichhold Chemical Company Limited, Schultz Diecasting Limited and Abex Industries Limited contribute flows to the creek. Therefore, during the summer, the creek acts only as a drainage course for carrying storm and industrial waste flows to the Scugog River.

The water pollution survey report released in 1970 showed evidence of sanitary wastes being discharged to Sinister Creek. Investigations indicated that a problem at Union Carbide Limited was contributing to the unsatisfactory bacteriological conditions noted in the creek. Union Carbide Limited took steps to correct the situation as soon as they were made aware of the problem. Additional samples collected after the problem was rectified, continued to show evidence of sanitary wastes in the creek but samples collected in April, 1971 were generally satisfactory in this regard. No other sources of sanitary wastes were located in the creek above the mouth.



LEGEND

OLD CREEK BED – – – – –
PRESENT " "
TSX-156·16 – STREAM AND MILEAGE
TSX-156·16 – STREAM AND MILEAGE AT OUTFALL
I – TYPE OF OUTFALL
I – INDUSTRIAL OUTFALL

NOTE: MILEAGE POINTS ARE NOT ACCURATE; USED ONLY TO INDICATE LOCATION RELATIVE TO EACH OTHER.

ENVIRONMENT ONTARIO

TOWN OF LINDSAY

SINISTER CREEK
WATER POLLUTION SURVEY
1972

SCALE: N.T.S.
DRAWN BY: R.D.L.
DATE: MAY 19, 1972
CHECKED BY:
DWG. Nº 72-33-DE

Union Carbide Limited has a treatment plant for its process wastes and the effluent is discharged to Sinister Creek. Treatment is provided for neutralization, suspended solids and BOD reduction, but the effluent has high concentrations of BOD, ammonia, sulphates and dissolved solids. Modifications have been made to remove 90 per cent of the ammonia wastes from the effluent being discharged to the creek. These wastes are being directed to a lagoon on their property for eventual treatment. At the present time Union Carbide Officials are investigating an ammoniacal evaporation/crystallization process which will allow the ammonium sulphate wastes to be recycled. This separation has also resulted in some reduction in the sulphates concentration in the effluent. Additional studies are being made by our Industrial Waste Branch in co-operation with Union Carbide Limited to determine what further improvements can be made to produce a more acceptable effluent.

Samples have been collected from Sinister Creek on five separate occasions since the last pollution survey report was released in February, 1970. A summary of the sample results have been enclosed in the Appendix in Tables No. IA and IB.

Near the mouth of Sinister Creek there is an emergency overflow arrangement to prevent the flooding of basements during periods of excessive hydraulic loading such as during heavy rainfall.

During the past year the frequency of bypassing at this location increased manyfold. This was subsequently found (in part) to be due to excessive loading on the collection system by increased industrial production and a corresponding increase in waste flows to the sanitary sewers. The town officials and industry have taken steps to reduce the amount of bypassing.

The effectiveness of the measures taken to date will be evaluated early this coming summer. The consulting engineering firm of Oliver, Lloyd & Associates Limited has been retained to study the town's sewage collection system and treatment facilities. The consultant was directed last year to give priority to the first phase of the study which was related to the collection system. It is expected that final design and implementation of the more urgently needed modifications to the sewage collection system to reduce the frequency of overflows will be completed late this year.

Sturgeon Lake Study

Although this report deals only with investigations within the Town of Lindsay, it should be noted that a survey was being carried out on Sturgeon Lake by other O.W.R.C. personnel. The purpose of the Sturgeon Lake Survey was to evaluate the lake water quality.

The survey of Sturgeon Lake involved daily sampling of the Lake for periods of five days in June, eleven days in August and five days in September. The results of the survey showed no measurable change in the bacterial quality of Sturgeon Lake as a result of flows from the Scugog River. The foregoing indicates that natural purification including bacterial reduction occurred in the Scugog River between Lindsay and Sturgeon Lake.

A detailed report on the Sturgeon Lake survey is being prepared at the present time. It should be ready for public distribution at about the time this report is expected to be released.

SUMMARY AND CONCLUSIONS

During the spring and summer of 1971, a number of investigations were made in the Town of Lindsay to locate sources of pollution and to determine what progress was being made to correct the existing problems.

There are a number of problems still outstanding in the Town. The problems of bypassing at the sewage pumping stations had increased at the time of the survey and were causing a more ostensible water pollution problem. The Town of Lindsay has initiated a program to locate sources of contamination reaching the storm sewers but a greater effort is needed. The necessary modifications to the Colborne Street Pumping Station are currently under final design, and should be implemented as soon as feasible. A study of the future sewage treatment needs should be initiated as soon as the required research has been completed on phosphorus removal. The municipal officials should ensure, by monitoring all the major industrial sources, that waste loadings on the sanitary sewerage system do not overload the existing facilities in the future. The effluent to Sinister Creek from Union Carbide Limited contained high concentrations of ammonium, sulphates and dissolved solids. The effluent also had a high bio-chemical oxygen demand. Studies are being made by our Industrial Wastes Branch in co-operation with Union Carbide Limited to improve the quality of their effluent.

RECOMMENDATIONS

1. Modifications to the existing pumping stations should be made as soon as feasible to prevent the discharge of raw sewage to the watercourses in the Town.
2. The sewage treatment facilities should be expanded and upgraded.
3. The municipal officials should initiate a sewer separation program as follows:
    a) determine points of access of sanitary wastes into storm sewers and make corrections.
    b) determine points of access of storm water and/or ground water into the sanitary sewer system and make corrections.
4. The municipal officials should initiate a program to monitor and to control the volume and strength of industrial wastes being discharged to the sanitary sewer collection system.

J.A. Clarke

Prepared by ....
J. A. Clarke, Civil Technologist,
District Engineers Section,
Sanitary Engineering Branch.

APPENDIX A

TOWN OF LINDSAY

POLLUTION SURVEY

1972

SAMPLE RESULTS

TABLES I & II

TOWN OF LINDSAY - WATER POLLUTION SURVEY

BACTERIOLOGICAL REPORT

TABLE 1(A)

All results reported
per 100 millilitres of sample

Scugog River and Outfalls
July 16, 1971

Sample Point No.	Location	Fecal Streptococcus	Fecal Coliforms	Total Coliforms
T.S.-158.00	Scugog River upstream of Town of Lindsay.	70	L 10	490
T.S.S.-157.90	Sucker Creek, Tributary to Scugog River.	190	L 1000	2,900,000
T.S.-157.85D	The "Big Ditch" draining to the Scugog River west of Lindsay St. South Bridge.	1,100	30	3,100
T.S.-157.84	Scugog River at Lindsay Street South Bridge.	20	30	900
T.S.-157.63	Scugog River at Municipal Water Purification Plant.	60	20	1,400
T.S.-157.40W	Outfall at Mary Street on West Bank of Scugog River.	L 10	L 10	L 10
T.S.-156.23W	Municipal Storm Sewer discharging to South Bank of Scugog River east of Lindsay Street.	L 10	L 10	1,100
T.S.-156.23WR	Municipal Storm and Relief sewer discharging to South Bank of Scugog River east of Lindsay Street.	G 15,000	67,000	3,600,000
T.S.-156.16W	Municipal Storm Sewer discharging to South Bank of Scugog River west of Lindsay Street.	150	4,700	13,000
T.S.-156.06	Scugog River at Wellington Street.	2,900	6,900	10,800
T.S.-156.06(E)W	Municipal Storm Sewer discharging to East Bank of Scugog River at Wellington Street.	1,100	50	46,000
T.S.-156.05(W)W	Municipal Storm Sewer discharging to West Bank of Scugog River north of Wellington Street.	50,000	176,000	3,900,000
T.S.-155.97W	Municipal Storm Sewer discharging to West Bank of Scugog River at Bond Street.	80	1,100	12,400

TABLE 1(A) CONTD.

Sample Point No.	Location	Fecal Streptococcus	Fecal Coliforms	Total Coliforms
T.S.X.-155.80	Mouth of "Sinister Creek".	1,900	430	46,000
T.S.-154.82	Scugog River downstream of Town of Lindsay.	140	490	6,900

G - means greater than
L - means less than

TOWN OF LINDSAY - WATER POLLUTION SURVEY

CHEMICAL ANALYSIS

All results reported
in ppm

TABLE 1(B)

Scugog River and Outfalls
July 16, 1971

Sample Point No.	Location	5-Day BOD	Suspended Solids	Chloride as Cl	Nitrate as N
T.S.-158.00	Scugog River upstream of Town of Lindsay.	3.0	10	10	L .01
T.S.S.-157.90	Sucker Creek, tributary to Scugog River.	6.5	30	102	L .01
T.S.-157.85D	The "Big Ditch" draining to the Scugog River west of Lindsay Street South Bridge.	0.6	5	172	L .01
T.S.-157.84	Scugog River at Lindsay Street South Bridge.	5.0	15	11	L .01
T.S.-157.63	Scugog River at Municipal Water Purification Plant	6.0	15	9	L .01
T.S.157.40W	Outfall at Mary Street on West Bank of Scugog River.	9.0	70	19	L .01
T.S.-156.23W	Municipal Storm Sewer discharging to South Bank of Scugog River east of Lindsay Street.	0.8	5	51	0.59
T.S.-156.23WR	Municipal Storm and Relief Sewer discharging to South Bank of Scugog River east of Lindsay Street.	12.	5	59	0.84
T.S.-156.06	Scugog River at Wellington Street.	5.0	10	10	L .01
T.S.-156.06(E)W	Municipal Storm Sewer discharging to East Bank of Scugog River at Wellington Street.	2.0	45	24	0.05
T.S.-155.97W	Municipal Storm Sewer discharging to West Bank of Scugog River at Bond Street.	0.6	5	26	0.11
T.S.X.-155.80	Mouth of "Sinister Creek"	3.5	10	28	0.10
T.S.-154.82	Scugog River downstream of Town of Lindsay	6.5	30	102	L .01

G - means greater than
L - means less than

TOWN OF LINDSAY - WATER POLLUTION SURVEY

BACTERIOLOGICAL REPORT

TABLE II(A)

All results reported
per 100 **millilitres**

"SINISTER CREEK"

Sample Point No.	Location	Date	Fecal Streptococcus	Fecal Coliforms	Total Coliforms
TSX-155.81	Sinister Creek just above mouth	Aug. 24/70	-	2,800	130,000
		Feb. 19/71	-	L 10	11,000
		Apr. 5/71	70	L 10	440
		Apr. 16/71	-	L 10	30
		Sept. 30/71	7,900	70	7,700
TSX-155.84	Sinister Creek at Caroline Street.	Aug. 24/70	-	1,500	300,000
		Feb. 19/71	-	500	10,000
		Apr. 5/71	80	8	400
		Apr. 16/71	L 10	L 10	80
		Sept. 30/71	11,600	50	7,000
TSX-155.89	Sinister Creek at St. Paul Street	Aug. 24/70	-	1,700	240,000
		Feb. 19/71	-	10	7,000
		Apr. 5/71	40	L 4	290
		Apr. 16/71	L 10	L 10	30
		Sept. 30/71	590	1,800	42,000
TSX-156.01	Sinister Creek at St. Patrick Street	Aug. 24/70	-	684	50,000
		Feb. 19/71	-	1,600	9,000
		Apr. 5/71	44	4	280
		Apr. 16/71	L 10	L 10	80
		Sept. 30/71	330	30	7,100
TSX-156.16	Sinister Creek at St. Peter Street	Aug. 24/70	-	72	12,000
		Feb. 19/71	-	L 10	5,900
		Apr. 5/71	L 4	12	1,000
		Apr. 16/71	L 10	L 10	100
		Sept. 30/71	260	L100	1,000
TSX-156.20I	Drainage from Schultz Diecasting Co. Ltd.	Aug. 24/70	-	L 4	64
		Feb. 19/71	-	12	136
		Apr. 5/71	24	70	5,000
		Apr. 16/71	L 10	L 10	240
		Sept. 30/71	370	80	12,000

TABLE II(A) CONTD.

Sample Point No.	Location	Date	Fecal Streptococcus	Fecal Coliforms	Total Coliforms
TSX-156.21I	Outfall from Abex Industries Ltd.	Aug. 24/70	-	L 4	76
		Apr. 5/71	L 4	L 10	250
		Apr. 16/71	L 10	L 10	L 10
		Sept. 30/71	L 10	L 100	L 100
TSX-156.41	Sinister Creek at St. David Street	Aug. 24/71	-	8	164
		Feb. 19/71	-	44	1,600
		Apr. 5/71	70	10	350
		Apr. 16/71	L 10	L 10	L 10
		Sept. 30/71	60	L 100	200
TSX-156.44I	Outfall from Reichhold Chemical Limited	Aug. 24/71	-	L 4	L 4
		Apr. 5/71	4	L 4	L 4
		Apr. 16/71	L 10	L 10	L 10
		Sept. 30/71	L 10	L 1,000	L 1,000
TSX-156.46I	Outfall from Union Carbide Ltd.	Aug. 24/71	-	4	4
		Apr. 5/71	200	L 50	L 50
		Apr. 16/71	L 10	L 10	20
		Sept. 30/71	L 10	L 100	L 1,000
TSX-156.47	Sinister Creek upstream of Union Carbide Limited Outfall	Apr. 5/71	36	10	280
		Apr. 16/71	L 10	L 10	L 10

G - means greater than
L - means less than

TOWN OF LINDSAY - WATER POLLUTION SURVEY

CHEMICAL ANALYSIS

TABLE II(B)

All results reported in ppm "SINISTER CREEK"

Sample Point No.	Location	Date Sampled	5-Day BOD	Suspended Solids	Nitrogen as N Total KJELD	Sulphate as SO4	pH @ Lab
TSX-155.81	Sinister Creek just above mouth	Aug. 24/70	4.0	5	-	1780	7.8
		Feb. 19/71	60.	100	10.	1700	-
		Apr. 5/71	1.8	-	12.	176	8.0
		Apr. 16/71	4.0	-	9.5	286	8.3
		Sept. 30/71	30.	10	55.	1650	-
TSX-155.84	Sinister Creek at Caroline Street	Aug. 24/70	5.0	5	-	1820	7.7
		Feb. 19/71	65.	90	10.	1640	-
		Apr. 5/71	1.8	-	12.	180	8.0
		Apr. 16/71	4.0	-	13.	340	8.3
		Sept. 30/71					
TSX-155.89	Sinister Creek at St. Paul Street	Aug. 24/70	5.0	10	-	1700	7.8
		Apr. 5/71	1.8	-	13.	180	8.1
		Apr. 16/71	4.0	-	10.	266	8.3
		Sept. 30/71	30.	10	55.	1650	-
TSX-156.01	Sinister Creek at St. Patrick Street	Aug. 24/70	5.0	10	-	1760	7.8
		Feb. 19/71	44.	70	10.	1680	-
		Apr. 5/71	1.4	-	23.	152	8.1
		Apr. 16/71	4.0	-	8.5	246	8.3
		Sept. 30/71	28.	10	50.	1625	-
TSX-156.16	Sinister Creek at St. Peter Street	Aug. 24/70	6.5	5	-	1880	7.8
		Feb. 19/71	22.	10	10.	1100	-
		Apr. 5/71	2.0	-	21.	264	8.0
		Apr. 16/71	4.0	-	8.5	270	8.3
		Sept. 30/71	28.	10	50.	1625	-
TSX-156.20I	Drainage from Schultz Diecasting Co. Ltd.,	Aug. 24/70	8.5	5	-	40	7.7
		Feb. 19/71	14.	15	1.2	34	-
		Apr. 5/71	1.8	-	0.85	29	7.7
		Apr. 16/71	11.	-	0.68	34	7.8
		Sept. 30/71	9.0	10	2.2	34	-

TABLE II(B) CONTD.

Sample Point No.	Location	Date Sampled	5-Day BOD	Suspended Solids	Nitrogen as N Total KJELD	Sulphate as SO4	pH @ Lab
TSX-156.21I	Outfall from Abex Industries Limited	Aug. 24/70	12.	10	-	32	7.6
		Apr. 5/71	7.0	-	1.3	46	7.8
		Apr. 16/71	22.	-	1.4	40	7.6
		Sept. 30/71	5.0	5	2.8	50	-
TSX-156.41	Sinister Creek at St. David Street	Aug. 24/71	12.	5	-	2640	7.5
		Feb. 14/71	36.	5	11.	1800	-
		Apr. 5/71	4.0	-	21.	288	7.2
		Apr. 16/71	5.5	-	12.	390	8.4
		Sept. 30/71	30-	5	70.	2000	-
TSX-156.44I	Outfall from Reichhold Chemical Ltd.	Aug. 24/71	0.6	5	-	31	7.2
		Apr. 5/71	0.8	-	0.45	40	7.6
		Apr. 16/71	2.0	-	0.45	29	7.9
		Sept. 30/71	0.4	5	0.92	30	-
TSX-156.46I	Outfall from Union Carbide Limited	Aug. 24/71	40.	5	-	2640	7.1
		Apr. 5/71	75.	-	450.	5900	9.0
		Apr. 16/71	30.		104.	3480	9.2
		Sept. 30/71	34.	10	45.	2050	-
TSX-156.47	Sinister Creek Upstream of Union Carbide Ltd. Outfall	Apr. 5/71	1.6		2.9	37	7.5
		Apr. 16/71	2.5		2.0	33	8.1

G - means greater than
L - means less than

APPENDIX B

TOWN OF LINDSAY
POLLUTION SURVEY
1972

INTERPRETATION AND SIGNIFICANCE
OF
LABORATORY RESULTS

APPENDIX B

INTERPRETATION AND SIGNIFICANCE OF LABORATORY RESULTS

The analyses employed to assess the water quality of the samples collected during this survey were: Biochemical Oxygen Demand (BOD), suspended solids, chlorides, sulphate, pH, nitrate nitrogen, total kjeldehl, and the determination of total coliform organisms, fecal coliform organisms and fecal streptococcus organisms.

BACTERIOLOGICAL EXAMINATION

The bacteriological indicators of contamination used during the survey were the total and fecal coliform organisms and fecal streptococcus organisms. Coliform organisms are most commonly found in human and animal excrement but they can also be found in soil. They are always present in large numbers in untreated sewage and are, in general, relatively few in number in other stream pollutants. The fecal coliform and fecal streptococcus organisms are more selective indicators of pollution. The fecal coliforms are an indicator of human or animal wastes. Several investigators have found a relationship between the number of fecal coliforms and the number of fecal streptococci present in a sample and the source of the waste being examined. It has been found that in wastes from humans there are a greater proportion of fecal coliforms than fecal streptococci. It has been suggested that if the ratio of fecal coliforms to fecal streptococci is 4:1 or greater the fecal coliform bacteria are from human wastes. When wastes from known animal sources are examined the results show the ratio of fecal coliform organisms to fecal streptococcus organisms is usually 0.7 or less.

The membrane Filter (MF) technique was employed to obtain a direct enumeration of organisms for Total Coliform Organisms (TC), Fecal Coliform Organisms (FC) and Fecal Streptococcus Organisms.

SANITARY CHEMICAL ANALYSES

BIOCHEMICAL OXYGEN DEMAND (BOD)

This test evaluates the loss of dissolved oxygen that accompanies the decomposition of organic matter carried out by organisms. It is an indirect measure of the amount of decomposable matter present and a direct measure of the respiratory oxygen requirements of the living organisms responsible for decomposition. A 5 day BOD determination with incubation at 20°C is reported. A high BOD is indicative of organic or chemical pollution. In most cases, adequate protection for surface waters should be provided if BOD concentrations in storm sewer, sewage treatment plant, and industrial waste discharges do not exceed 15 ppm.

SOLIDS

The total solids determination is the sum of the values of suspended solids and dissolved solids. The suspended solids value is the most significant of the solids determinations, and indicates a measure of the undissolved solids of organic or inorganic nature. The effects of suspended solids in water are reflected in difficulties associated with water purification, depositions in streams and injury to the habitat of fish. In most cases, adequate protection for surface waters should be provided if suspended solids concentrations in storm sewer, sewage treatment plant and industrial waste discharges do not exceed 15 ppm.

CHLORIDES

Chlorides are found in most natural waters. They may originate from (1) natural minerals, (2) sea-water contamination of ground water (3) agricultural practices (4) human and animal sewage and (5) industrial effluents. A sudden increase in the chloride concentration of a water supply may indicate pollution. Any effluent having an excessive concentration of chloride should be investigated for possible contamination by sanitary or industrial wastes.

NITRATES

Nitrate is the end product of aerobic decomposition of nitrogenous matter. Nitrates occur in the crust of the earth in many places and are a source of its fertility. Although there are many sources of nitrates, they are rarely abundant in natural surface waters since they are essential fertilizers for all types of plants. The following ranges in concentration may be used as a guide: low, less than 0.1 ppm; moderate, 0.1 to 1.0 ppm; high, greater than 1.0 ppm.

TOTAL KJELDAHL

Total kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia Nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

pH

The pH value, for practical purposes, refers to acidity or alkalinity, and is a measure of intensity rather than quality. The pH scale extends from zero (very acidic) to 14 (very alkaline), with the middle value of 7 corresponding to neutrality at 25° Centigrade. The pH of surface water should be in the range of 6.7 to 8.5.

Sulphates

Sulphates occur naturally in ground and surface waters. They may also occur as the final oxidized stage of sulphides, sulfites thiosulphates. Sulphates may be discharged in numerous industrial wastes such as those from tanneries, sulphate pulpmills, textile mills, etc. Some forms of sulphate are relatively insoluble but others like ammonium sulphate are highly soluble. Waters containing high sulphate levels, above 250 ppm, are not recommended for drinking water where other more suitable water supplies are available.

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